

## SECTION 14245

### HYDRAULIC ELEVATORS - PASSENGER

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. Hydraulic elevator system; hydraulic cylinder in buried casing.
- B. Passenger cab with doors and frames; hoist way entrance doors and frames.
- C. Excavating and backfilling for plunger casing.
- D. Motor and pump, controllers, hoist way, equipment, and accessories.

##### 1.2 LANL PERFORMED WORK

- A. Elevator inspection and certification.

##### 1.3 QUALITY ASSURANCE

- A. The installer shall be either the elevator manufacturer or a licensee of the manufacturer who has completed at least 10 installations of similar size and scope.

##### 1.4 SUBMITTALS

- A. Submit the following in accordance with the requirements of Section 01300:
- B. Catalog data on the following items:
  - 1. Signal and operating fixtures, operating panels, indicators.
  - 2. Cab design, dimensions, layout, and components.
  - 3. Cab and hoist way doors and frames.
  - 4. Electrical characteristics, connection requirements and wiring diagrams.
- C. Samples: Submit 2 samples, [    x    ] inch in size illustrating cab floor material, cab interior finishes, cab and hoist way door and frame finishes.
- D. Shop Drawings indicating the following information:
  - 1. Motor and hydraulic pump, valves, controller, selector, governor and other component locations.
  - 2. Car, machine beams, guide rails, buffers, and other components in hoist way.
  - 3. Rail bracket spacing; maximum loads imposed on guide rails requiring load transfer to building structural framing.
  - 4. Individual weight of principal components; load reaction at points of support.
  - 5. Loads on hoisting beams.
  - 6. Clearances and overtravel of car.

7. Location of components in machine room.
8. Locations in hoist way and machine room of connections for car light and telephone.
9. Location and sizes of access doors, doors, and frames.
10. Expected heat dissipation of elevator equipment in machine room.
11. Applicable seismic design data; certified by a Registered Professional Structural Engineer.
12. Electrical characteristics and connection requirements.
13. Show arrangement of equipment in machine room such that moving elements and other equipment can be removed for repairs or replaced without disturbing other components. Arrange equipment for clear passage through access door.
14. Cab and hoist way door and frame details.
- [15. Interface with building security system.]

E. Operation and Maintenance Data.

1. Include a parts catalog with complete list of equipment replacement parts; identify each entry with equipment description and identifying code.
2. Provide technical information for servicing operating equipment.
3. Provide a legible schematic of hydraulic piping and wiring diagrams of installed electrical equipment, and changes made in the Work. List symbols corresponding to markings on machine room and hoist way apparatus.
4. Provide a list indicating all of the elevator equipment with a description, a picture and a current part number. The manuals shall include a drawing of the controller (relay panel, starter panel, selector panel, etc.) to show the apparatus and its exact location. The apparatus shown in the drawing shall be numbered. The number shall then be listed in the manual for proper identification. A suggested list of spare parts and quantities needed for stocking at the site shall be included.
5. Submit a complete sequence of operation and control of the elevator system which shall include the functions of signals, door devices, fire service, attendant operation, independent service and all other pertinent functions of the system, including a trouble shooting section.
6. Provide a list with the name of the manufacturer, type or style designation for each of the following: Driving machine, driving machine motor including HP and RPM, elevator controller, selective collective relay panel, elector, power door operator, door interlocks and electrical contacts, buffers including stroke, certified maximum and minimum loads and the maximum striking speed of car, car ventilation blower, car emergency lighting, hall and car signal fixtures and position indicators.
7. The manuals shall be the property of the LANL and shall not be stamped anywhere therein "Property of the Elevator Company."
8. Provide one copy of master electric and hydraulic schematic and one copy of lubrication chart, each framed with clear plastic; mount on machine room wall.

## 1.5 REGULATORY REQUIREMENTS

- A. Conform to Uniform Building Code and NFPA 101 - Life Safety Code for manufacture and installation of elevator system.
- B. Conform to ANSI/ASME 17.1 - Safety Code for Elevators and Escalators.
- C. Conform to ANSI/ASME 17.2 - Inspector's Manual for Elevators and Escalators.
- D. Conform to ANSI A117.1 for provisions for the physically handicapped.
- E. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., or a testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

## 1.6 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Dover Elevator Oildraulic, Marquis 25
- B. Montgomery
- C. Otis Elevator LR Systems

### 2.2 BASIC REQUIREMENTS

- A. The Work of this Section includes the complete and operational systems for one direct plunger type hydraulic passenger elevator with motor and pump at lower level located in the Elevator Machine Room (see Drawings) as follows.
  - 1. Capacity of [2000] pounds Class A Loading.
  - 2. Rated Speed of 125 fpm.
  - 3. [2] Floors served
  - 4. One opening on each floor.
  - 5. [15'-10"] travel
  - 6. Car size (clear inside): 5'-8" x 4'-3"
  - 7. Suspended ceiling height of 7'-4"
  - 8. Hydraulic type.
  - 9. Power supply: 480V, 3 phase, 60 Hz., 20 hp, Amperage: 90 amp standard; 60 amp thermal trip circuit breaker; 40 amp fusetrone.
  - 10. Lighting supply of 120V, 1 phase, 60 Hz.
  - 11. Signal supply of 48 Vdc.

12. Car Enclosure: Applied panel type.

## 2.3 CAR FEATURES

- A. Car Enclosure: To meet structural requirements and design data in conformance with the ANSI/ASME 17.1 Code.
  - 1. Enclosure Panels: Side shall be 14 gauge furniture steel shell panels, with painted finish. Fronts shall be swing type, stainless steel with #4 finish.
  - 2. Car Doors: Car entrances shall be provided with single speed doors, suitably reinforced, stainless steel with #4 finish.
  - 3. Car Canopy: 14 gauge reinforced furniture steel with painted finish, top exit, and fluorescent lighting above suspended eggcrate ceiling, to provide adequate and uniform lighting.
- B. Door Type/Hoist way Entrances: Single speed.
- C. Door Opening Size: 3'-0" x 7'-0".
- D. Door Operation: DC power.
- E. Hoist way Doors and Entry Frame Finish: Stainless steel with #4 finish.
- F. Car Interior
  - 1. Features shall comply with ANSI 117.1.
  - 2. Applied Panels: Wood core with plastic laminate face and standard edge system.
  - 3. Car Protective Pads and Hooks.
  - 4. Stainless Steel Handrails: At side walls.
- G. Car and Hall Operating Buttons: Mechanical - Illuminated, with required signs for the handicapped.

## 2.4 HOIST WAY ENTRANCES

- A. Frames
  - 1. Provide bolted construction frames, 14 gauge, for a one piece unit assembly composed of head and side jamb sections. Securely fasten frames to sills and header. Provide manufacturer's standard jamb width.
  - 2. Jamb depth: suit [3 5/8" metal stud wall].
- B. Provide extruded aluminum sills with non-slip wearing surfaces and grooves for door guides. Support sills on steel angles furnished and installed by elevator contractor.
- C. Fabricate fascia plates from 14 gauge steel, fastened to the header and sill above.
- D. Fabricate toe guard from 14 gauge steel, provided at the lowest landing, beveled to the wall.
- E. Fabricate dust cover from 14 gauge steel, provided at highest landing.
- F. Provide headers of sufficient size and thickness to provide support for frame and hangers, securely fastened to strut angles and with integral hanger tracks.

- G. Provide strut angles of sufficient size to support the entrance, and securely fastened to the building structure.
- H. Provide hangers of sheave type, two sheaves per door, rotating on precision ball bearing. Roller shall be on an electric stud to provide adjustment.
- I. Doors: Size 3'-0" x 7'-0" as indicated, 1 1/4" thick, fabricated from 16 gauge furniture grade steel sheet material with vertical internal channel reinforcements spaced at not more than 6" on centers and welded to face sheets. Provide bottom of doors with removable phenolic guides which run in sill slots with minimum clearance.
- J. Provide entrances manufactured in accordance with procedures established by I.C.B.O., and so labeled.
- K. Sight Guards: Provide on the leading edge of the doors to conceal the hoist way beyond the doors. Finish to match door panels.
- L. Provide jamb marking plates to meet handicapped requirements with raised floor markings to identify each landing, applied to both jambs on each entrance.

## 2.5 POWER UNIT AND RELATED COMPONENTS

- A. Provide motors, pumps, controllers, hydraulic fluid reservoir, cylinder, casing, plunger, piping, guide rails, buffers, buttons, wiring, indicators, and hardware and fittings to provide a fully operational elevator. All elevator components shall be the products of one manufacturer, provided such items are capably engineered and produced under coordinated specifications to ensure a high grade, smooth and safe operation, including the following.
  - 1. Power Unit:
    - a. Oil pumping and control mechanism shall be compactly and neatly designed to lift the rated load at the rated speed, and hold the rated load at the floor level, with all components listed below combined in self-contained unit: floating inner base for mounting motor pump assembly; oil reservoir with tank cover and controller compartment with cover; an oil-hydraulic pump; an electric motor; an oil control unit with following components built into single housing; high pressure relief valve; check valve; automatic unloading up start valve; lowering and leveling valve; and magnetic controller.
    - b. Pump shall be designed and manufactured by oil-hydraulic elevator service, and shall be positive displacement type, designed for steady discharge with minimum pulsations to give smooth and quiet operation. Output of pump shall not vary more than 10% between no load and full load on elevator car.
    - c. Drive shall be multiple V-belts or direct coupling, and sheaves of number and size to insure maximum factor of safety.
    - d. Motor shall be designed for oil-hydraulic elevator service, of standard manufacture, and of duty rating complying with specified speeds and loads.
    - e. Oil Control Unit shall consist of following components, all built into single housing. Welded manifolds with separate valves to accomplish each function will not be acceptable. All adjustments shall be accessible and shall be made without removing assembly from oil line.
    - (1) Relief Valve shall be externally adjustable, and shall be capable of bypassing total oil flow without increasing back pressure more than 10% above required to barely open valve.

- (2) Up Start and Stop Valve shall be externally adjustable, and designed to bypass oil flow during start and stop of motor pump assembly. Valve shall close slowly, gradually diverting oil to or from Jack Unit, insuring smooth up starts and up stops.
  - (3) Check Valve shall be designed to close quietly without permitting any perceptible reverse flow.
  - (4) Lowering Valve and Leveling Valve shall be externally adjustable for drop-away speed, lowering speed, leveling speed and stopping speed to insure smooth "Down" starts and stops. Leveling valve shall level car to floor in direction car is traveling when slowdown is initiated.
- f. Provide electric controller of relay logic type. Solid state devices will not be allowed. Silver to silver contacts shall be utilized on all relays and connectors. Thermal overload relays to be provided to protect motor. All component switches to be mounted in NEMA 1 enclosure.
- B. Provide mainline strainer of self-cleaning type, equipped with 40 mesh element, installed in oil line.
- C. Provide sound insulating panels made of reinforced 16 gauge steel with 1 1/2" core of glass fiber affixed to interior, mounted on all four open sides of power unit frame.
- D. Install a minimum of two sound isolating couplings in oil line in machine room between pump and jack.
- E. Provide an oil-hydraulic muffler device at power unit location. Silencer shall contain pulsation absorbing material inserted in blowout proof housing arranged for inspecting interior parts without removing unit from oil line. Rubber hose without blowout proof features will not be acceptable.
- F. Provide vibration pads mounted under power unit assembly to isolate unit from building structure.
- G. Provide a jack unit designed and constructed in accordance with requirements of ANSI/ASME 17.1, and of sufficient size to lift gross load to height specified and shall be factory tested to insure adequate strength and freedom from leakage. No brittle material, such as grey cast iron is acceptable.
  - 1. Provide a plunger made of heavy seamless steel tubing accurately turned and polished; stop ring electrically welded to plunger to positively prevent plunger leaving cylinder. Internal guide bearing; packing or seal of suitable design and quality; drip ring around cylinder top; cylinder made of steel pipe and provide with pipe connection and air bleeder.
  - 2. Weld brackets to jack cylinder for supporting elevator on pit channels. An auxiliary safety bulkhead shall be provided in lower end of cylinder.
  - 3. Elevator contractor shall be responsible for drilling jack hole and shall provide, where necessary, an auxiliary casing.
- H. Double wrap jack cylinder and any under-ground piping with approved coating designed to protect from electrolytic and chemical corrosion.
- I. Provide all necessary wiring installed in hoist way in accordance with National Electrical Code. Provide all necessary pipe and fittings to connect power unit to jack unit and oil of proper grade.

- J. Provide automatic guide rail lubricators mounted on top of upper guide shoes. Wool felt wiper shall apply an even, uniform flow of oil which shall thoroughly lubricate faces of guide rail from leak-proof oil reservoir.
- K. Design the electrical control circuit such that if malfunction should occur due to motor starter failure, oil becoming low in system, or car failing to reach landing in up direction within pre-determined time, elevator car will automatically descend to lowest terminal landing.
- L. Provide and automatic self-leveling function to correct for over-travel or under-travel. Elevator car shall be level with floor landings regardless of load or direction of travel.
- M. Fabricate car frame from steel members and provided with adequate bracing to support platform and car enclosures.
- N. All wiring and electrical interconnections shall comply with NFPA-70. Insulated wiring shall have flame retardant and moistureproof outer covering, and run in conduit, tubing or electrical wireways. Traveling cable shall be flexible and suspended to relieve strain on individual conductors.
- O. Provide normal terminal stopping devices to slow down and stop car automatically at terminal landings and to automatically cut off power should car travel beyond terminal landings.
- P. Provide pit switch in pit, accessible from pit access door.
- Q. Install buffers in pit for stopping car at bottom limits of travel.
- R. Provide guides mounted on top and bottom of car frame to engage guide rails.
- S. Provide platform of Class A construction.

## 2.6 OPERATION

- A. Selective Collective Automatic Operation
  - 1. General:
    - a. Control of elevator shall be automatic in operation by means of push bottoms in car numbered to correspond to floors served, for registering car stops and by "up-down" push buttons at each landing and "call" push bottoms at terminal landings.
    - b. Each landing call shall be canceled when answered.
    - c. Pressing of an "up" bottom when car is traveling in down direction shall not intercept travel unless stop for that floor has been registered by car button, or unless up call is the lowest for which any button has been pressed.
    - d. When car has responded to its highest or lowest stop, and stops are registered for the opposite directions, its direction of travel shall reverse automatically and it shall answer calls registered for that direction.
- B. Car Top Inspection Station:
  - 1. Provide a car top inspection station with portable operating controls in accordance with ANSI A17.1.
  - 2. The controls will have an "emergency stop" switch and constant pressure "up-down" direction buttons that make normal operating devices inoperative and give the inspector complete control of the elevator.

- C. Provide an emergency stop switch in the elevator pit where it is accessible from the pit access door. It shall be designed to remove power from the machine, and stop the elevator independent of the regular operation circuit. Locate switch 54 inches from the sill of the access door, next to the light switch.
- D. Fire emergency elevator operation shall comply with the requirements of ANSI A17.1 for Phase I and II fire service. The fire key shall be given to the LANL. The key will be kept in a LANL furnished and installed key box mounted adjacent to the elevator at the first floor landing.
- E. Independent Elevator Operation
  - 1. A key operated switch in the car panel shall provide independent service operation. When turned to the "on" position, all the previously registered calls (hall and car) for the elevator will be canceled and the elevator will be transferred to independent service for operation by an attendant.
  - 2. The elevator car will park at the floor with its doors open. To close the doors and start the elevator in the up or down direction, the desired car floor push or the door close button must be held in, until the doors close and the elevator starts to move. The elevator car will proceed and stop at the desired floor automatically. While on independent service, the elevator car will by-pass hall calls, they will not illuminate or register calls.

## 2.7 SIGNALS AND ACCESSORIES

- A. Provide illuminated car push buttons.
- B. Provide hall lanterns conforming to handicap requirements at all floors to announce arriving car and indicated direction of travel.
- C. Provide a car position indicator conforming to handicap requirements in the car.
- D. Provide hall buttons on all floors as follows: At the top and bottom floor a single push button is required. When a hall button is pressed it will become illuminated and stay illuminated until the call is canceled.
- E. Mount the alarm bell as required by ANSI/ASME A17.1, midway in the elevator hoist way, and connect to both the emergency alarm button and emergency stop switch in the car operating panel.

## PART 3 EXECUTION

### 3.1 INSPECTION

- A. Prior to beginning installation of elevators, examine and verify that no irregularities exist that would adversely affect quality of execution of this Work.
- B. Do not proceed with installation until previous work conforms to project requirements.
- C. Verify that field measurements are as indicated on shop drawings.

### 3.2 INSTALLATION

- A. General
  - 1. Install elevator in accordance with accepted manufacturer's installation instructions, approved shop drawings and ANSI/ASME A17.1.



2. Install machine room equipment with clearances complying with ANSI/ASME A17.1 and NFPA 101.
  3. Install equipment to afford maximum safety and continuity of operation in the event of seismic activity.
- B. Guide Rails
1. Install rails continuous for full height of hoist way with no gap at joints.
  2. Align rails vertically within a tolerance of 1/16 inch in 24 feet.
- C. Adjustments
1. Adjust motors, pumps, valves, controllers, leveling switches, limit switches, stopping switches, door operators, interlocks and safety devices to achieve required performance levels.
  2. Fabricate and assemble various parts in shop insofar as practical to minimize field assembly. Parts requiring close field fit which cannot be shop assembled shall be trial assembled in shop and marked for field erection.

### 3.3 FIELD QUALITY CONTROL

- A. Inspection:
1. During construction, the elevator installation and the construction of adjacent related building components, such as the elevator pit, equipment room and hoist way, will be inspected by an ASME qualified inspector provided by LANL.
  2. Final inspection and testing by the Contractor shall be performed after the elevator installation, hoisting enclosure and machine room are complete.
  3. The Contractor shall inspect the installation in accordance with ANSI/ASME A17.2.
  4. At such time as LANL may direct, the Contractor shall conduct complete acceptance tests for approval in accordance with ANSI/ASME A17.1, Part X. The elevator test shall consist of 60 minutes at full load with the car stopped at each landing in each direction of travel for a waiting period of from 5 to 10 seconds.
  5. Before final acceptance, the elevator will be inspected and certified by an ASME-qualified inspector provided by the LANL.
- B. Insulation Resistance Test: Test safety circuit, door lock circuit, loop circuit, and motor and generator field circuits at 500 volts. Minimum resistance to ground shall be one megohm.
- C. Running Test: With equipment within 5 degrees of ambient machine room temperature, the following shall be accomplished:
1. Insert thermometers in pump motor.
  2. Check floor to floor performance time, speed, leveling accuracy and general ride of elevator with no load, balanced load and full load in car.
  3. Run fully loaded car continuously for a period of one hour, stopping at each floor in both directions for a period of 10 seconds.
- D. Test Results

1. In all test conditions speed and performance times specified shall be met, leveling accuracy shall be maintained without re-leveling and general riding quality shall be acceptable to the Construction Inspector.
2. Temperature rise in windings shall not exceed 50 degrees Celsius above ambient.
3. Replace equipment that is defective due to manufacture, installation or poor workmanship including any non compliance to codes or specifications requirements.

#### 3.4 CLEAN UP

Remove from hoist way surfaces loose materials and filings resulting from elevator installation. Clean machine room floor of dirt, oil and grease. Remove crating and packing materials from site.

END OF SECTION

# GUIDANCE FOR COORDINATION OF ELEVATOR CONSTRUCTION DOCUMENTS

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Mechanical and Electrical Sections need to include requirements for meeting ANSI/ASME 17.1 and 17.2 codes, UBC and NFPA 101 in their drawings and specifications. Specific examples follow.

A. ANSI/ASME A 17.1, 106.1e 1 - Illumination of pits.

"A permanent lighting fixture shall be provided and shall conform to the following:

1. The lighting shall provide an illumination of not less than 5 footcandles (54 lux) at the pit floor.
2. The light bulb (s) shall be externally guarded to prevent contact and accidental breakage.
3. The light switch shall be so located as to be accessible from the pit access door.
4. A duplex receptacle rated at no less than 15A, 120V shall be provided."

B. ANSI/ASME A17.1, 1.02 1 - Installation of electrical equipment and wiring in hoist ways and machine room.

"All electrical equipment and wiring shall conform to the requirements of ANSI/NFPA 70.

Only such electrical wiring raceways, and cables used directly in connection with the elevator, including wiring for signals, for communication with the car, for lighting, heating, air conditioning, and ventilating the car, for fire-detecting systems, for pit sump pumps, and for heating and lighting the hoist way, may be installed inside the hoist way."

C. ANSI/ASME A17.1, 102.2d - Installation of Pipes and Ducts Conveying Gases, Vapors or Liquids in Hoist ways, Machine Rooms or Machinery Spaces.

"Pipes or ducts conveying gases, vapors, or liquid and not used in connection with the operation of the elevator shall not be installed in any hoist way, machine room, or machinery space."

D. ANSI/ASME A17.1, 102.2c - Installation of Pipes or Ducts conveying Gases, Vapors, or Liquids in Hoist ways, Machine Rooms, or Machinery Spaces. "Standard sprinkler protection conforming to the requirements of ANSI/NFPA 13 may be installed in these spaces, subject to the following:

1. All risers and returns shall be located outside these spaces.
2. Branch lines in the hoist way shall supply sprinklers at not more than one floor level.
3. Shutoff valves shall be provided for each branch line in accessible locations outside these spaces.
4. Means shall be provided to automatically disconnect main line power supply to the affected elevator prior to the application of water. This means shall not be self-resetting. The activation of sprinklers outside of the hoist way or machine room shall not disconnect the main line power supply.
5. Smoke detectors shall not be used to activate sprinklers in these spaces or to disconnect the main line power supply."

Sprinkler protection is not required by the elevator code, but the code stipulates that branch line shutoff valves shall be provided to terminate sprinkler water to specified areas. No contradiction exists between NFPA and ANSI A17.1 regarding shutoff valves since the installation of supervised shutoff valves will meet the requirements of both codes.

Provide supervised shutoff valves for each branch line servicing the hoist way machine room, or machinery spaces. These valves shall be in accessible locations outside of the hoist way and machine room.

- E. ANSI/ASME A17.1, 102.2c 4 - Installation of Pipes or Ducts Conveying Gases, Vapors, or Liquids in Hoist ways, Machine Rooms, or Machinery Spaces. Standard sprinkler protection conforming to the requirements of ANSI/NFPA 13 may be installed in these spaces, subject to the following:

"Means shall be provided to automatically disconnect the main line power supply to the affected elevator prior to the application of water. This means shall not be self-resetting. The activation of sprinklers outside of the hoist way or machine room shall not disconnect the main line power supply."

1. Within Machine Rooms, or Machinery Spaces

- a. Provide a "particles of combustion" detector that would activate Phase I fire recall. This detector is not required to be tied into the automatic alarm system.
- b. Provide a rate-of-rise/fixed-temperature heat detector which once activated would automatically disconnect the main line power supply to an affected elevator by means of a shunt trip circuit breaker, after Phase I fire recall has been completed, if Phase I has already been initiated by the particles of combustion detector. IF Phase I has not been initiated by the particles of combustion detector, then prior to the application of water the elevator controls shall assure that:
- c. Provide a wet pipe sprinkler system with a rating higher than that of the heat detector.

2. Within the Elevator Hoist way

- a. Provide a rate-of-rise/fixed-temperature heat detector which once activated would automatically disconnect the main line power supply to an affected elevator by means of a shunt trip circuit breaker once the elevator controls had assured that:
  1. The elevator car is at any floor with the doors completely open.
  2. If the elevator car is traveling either in the up or down direction, the car would be taken to the nearest floor in the direction of travel and completely open its doors.
  3. If already activated by a particles-of-combustion detector, Phase I fire recall would be completed.
- b. Provide a wet pipe sprinkler system with a rating higher than that of the heat detector.

3. Install an indicator light beside the fire department lock box that would light to indicate that elevator power had been interrupted by the heat detector in

either the hoist way or the elevator equipment room.

4. Provide a safe and convenient means within the elevator machine room to reactivate main line elevator power by authorized personnel.
- F. ANSI/ASME A17.1 101.5b - Ventilation for Machinery and Control Equipment. "Machine rooms shall be provided with natural or mechanical ventilation to avoid overheating of the electrical equipment and to ensure safe and normal operation of the elevator."
- G. ANSI/ASME A17.1, 100.4 - Control of Smoke and Hot Gases. Hoist ways of elevators shall be provided with means to prevent the accumulation of smoke and hot gases in case of fire as required by the building code.

Where air pressurization of the hoist way is utilized as a means of smoke and hot gas control, the air shall not be introduced into the hoist way in such a manner as to cause erratic operation by impingement of traveling cables, selector tapes, governor ropes, compensating ropes, and other components sensitive to excessive movement or deflection.

UBC 1988, Section 5104 hoist way venting. Shafts housing elevators extending through more than two floor levels shall be vented to the outside. The area of the vent shall be not less than 3 1/2 percent of the area of the elevator shaft, provided a minimum of 3 square feet per elevator is provided.

EXCEPTION: Where energy conservation or hoist way pressurization requires the vents be normally closed, automatic venting by actuation of an elevator lobby detector or power failure may be accepted. A manual override may be provided.

- H. ANSI/ASME A17.1 101.5a - Lighting. Permanent electric lighting shall be provided in all machine rooms and machinery spaces.
- The illumination shall be not less than 10 footcandles (108 lux) at the floor level. The lighting control switch shall be located within easy reach of the access to such rooms or spaces. Where practicable, the control switch shall be located on the lock - jamb side of the access door.
- I. ANSI/ASME A17.1, 101.5c - Receptacles. A duplex receptacle rated at not less than 15A, 120V shall be provided in each machine room and machinery space.
- J. ANSI/ASME A17.1, 211.3b - Smoke Detectors. "Smoke detectors shall be installed in each elevator lobby at each floor and associated machine room in accordance with NFPA No. 72E, Chapter 4."
- K. ANSI/ASME A17.1, 101.1a(2) - Enclosures of machine rooms and machinery spaces, enclosures required for elevators having fire-resistive hoist way enclosures.

"Enclosures and access doors thereto shall have a fire endurance at least equal to that required for the hoist way enclosure and hoist way doors, respectively."

Doors must be labeled to indicate their compliance with NFPA and ANSI/ASME A17.1 code provisions.

- L.
1. "Hoist ways shall be enclosed throughout their height with fire-resistive enclosures as required by the building code."
  2. "All hoist way openings shall be provided with fire-resistive protective assemblies. The fire-resistance rating shall be not less than 1 1/2 hour when installed in 2 hour fire-resistance-rated construction. Protective assemblies installed in fire resistance-rated

construction of less than 2 hour shall have ratings as required by the building code. The fire-resistance rating shall be determined by the test specified in Section 1102,"

- M. ANSI/ASME A17.1, 101.1a - (Machine Rooms) Enclosures required for elevators having fire-resistive hoist way enclosures.
1. "Spaces containing machines, control equipment, sheaves, and other machinery shall be protected from the weather, and shall be enclosed with fire-resistive enclosures except:
    - A. Partitions between elevator machine rooms and fire-resistive hoist ways."
  2. "Enclosures and access doors thereto shall have a fire endurance at least equal to that required for the hoist way enclosure and hoist way doors, respectively."
- Seal all penetrations and openings with materials or assemblies that will maintain fire integrity.
- N. Rule 210.4 Electrical equipment and wiring. All electrical equipment and wiring shall conform to the requirement of ANSI/NFPA 70.
- NEC 620.22 Car light source. A separate branch circuit shall supply the car lights for each elevator.
- Install a 20 amp disconnect in elevator machine room for 110V lighting of the elevator car per ANSI A17.1, 210.4 and NEC 620.22 although it is not required to be in the machine room by code, it is necessary that this disconnect be located there for maintainability.
- O. ANSI/ASME A17.1, 106.1f - Stop Switch in Pits. "There shall be installed in the pit of each elevator an enclosed stop switch or switches meeting the requirements of Rule 210.2g.
- "This switch shall be so located as to be accessible from the pit access door. Where access to the pits of elevators in a multiple hoist way is by means of a single access door, the stop switch for each elevator shall be located adjacent to the nearest point of access to its pit from the access door."
- "In elevators where access to the pit is through the lowest landing hoist way door, a stop switch shall be located approximately 18 in. above the floor level of the landing, within reach from this access floor and adjacent to the pit ladder if provided. When the pit exceeds 6 ft. 7 in. in depth, an additional stop switch is required adjacent to the pit ladder and approximately 4 ft. above the pit floor. Where more than one switch is provided, they shall be wired in series."
- P. ANSI/ASME A17.1, 106.1d - Access to Pits. "Safe and convenient access shall be provided to all pits, and shall conform to the following."
1. "Access shall be by means of the lowest hoist way door or by means of a separate pit access door.
  2. There shall be installed in the pit of each elevator where the pit extends more than 3 ft. (914 mm) below the sill of the pit access door, a fixed vertical ladder of non-combustible material, located within reach of the access door. The ladder shall extend not less than 42 in. (1067 mm) above the sill of the access door, or handgrips shall be provided to the same height.
  3. Pits shall be accessible only to authorized persons.
  4. Where a separate pit access door is provided, it shall be self-closing and provided with a

spring-type lock arranged to permit the door to be opened from inside the pit without a key. Such doors shall be kept locked.

5. If the door swings into the pit, it shall be located so that it does not interfere with moving equipment.
6. The door shall have a minimum width of 30 in. (762 mm) and a minimum height of 6 ft. (1829 mm)."

Comply with code provisions, additionally, noting can be run between the wall and the ladder.

Q. ANSI/ASME A17.1, 101.3a - Access to machine rooms and machinery spaces shall be from a corridor, or the building exterior.

R. ANSI/ASME A17.1, 211.1 - Section 211 Emergency Operation and Signaling Devices. Car Emergency Signaling Devices. "Elevators shall be provided with the following signaling devices."

1. "In all buildings, the elevator shall be provided with the following:
  - a. An audible signaling device, operable from the emergency stop switch, where required by Rule 210.2 (e), and from a switch marked "ALARM" which is located in or adjacent to each car operating panel. The signaling device shall be located inside the building and audible inside the car and outside the hoist way. One signaling device may be used for a group of elevators.
  - b. Means of two way conversation between the car and the readily accessible point outside the hoist way which is available to emergency personnel (telephone, intercom, etc.). The means to activate the two-way conversation system does not have to be provided in the car.
  - c. If the audible signaling device, or the means of two-way conversation, or both, are normally connected to the building power supply, they shall automatically transfer to a source of standby (emergency) power within 10 seconds after the normal power supply fails. The power source shall be capable of providing for the operation of the audible signaling device for at least 1 hour, and the means of two-way conversation for at least 4 hours.
2. In building in which a building attendant (building employee, watchman, etc.) is not continuously available to take action when the required emergency signal is operated, the elevators shall be provided with a means within the car for communicating with or signaling to a service which capable of taking appropriate action when a building attendant is not available.

A standby (emergency) power system shall be provided conforming to the requirements of Rule 211.1 (a) (3)."

Install a telephone in elevator car before final elevator inspection.